



Co-funded by the
Erasmus+ Programme
of the European Union

Cognitive Map – an example of practical use

Chemistry lesson

Cognitive map of the task used on chemistry lesson – please, watch the film „Mediation during chemistry lesson“

Cognitive map helps us to analyze the learning experience. It uses seven aspects.

1) Content (the subject matter):

- modification of chemical equations;
- conservation law for mass;
- number of atoms of chemical elements in molecules
- notation of number of atoms and number of molecules
- experiencing chemical notations

2) Modality (language or variety of languages used for receiving information and expressing the results):

- Spatial model
- Pictorial
- Symbolic
- Verbal

3) Phase of the mental act:

- Input (data gathering)
 - Clear and detailed perception
 - Systematic exploratory behavior
 - Well-developed verbal tools
 - Conservation of constancies
 - Need for precision and accuracy in data gathering
- Elaboration (organizing and analyzing the data)
 - Ability to identify and define the problem
 - Well-developed spontaneous comparative behavior
 - Broad mental field
 - Ability to use inferential-hypothetical thinking
 - Well-developed summative behavior
 - Well-developed planning behavior



- Output (expressing the conclusion)
 - Ability to communicate well-elaborated responses
 - Need for precision and accuracy in communicating the response
 - Ability to project virtual relationships
 - Well-developed self-regulation and ability to avoid trial-and error response
 - Well-developed functions of visual transport
- 4) Cognitive operations (activity of the brain during the elaboration phase in order to generate new information):**
 - Identifying
 - Differencing
 - Counting
 - Comparing
 - Analogical thinking
 - Analyzing
 - Deducing
 - Inducing
- 5) Level of Complexity (quantity and novelty of information to be handled in a mental act)**

Moderate to high –

 - New elements: notation of chemical equation, conservation law for mass
 - Need to keep in mind: the number of atoms in the molecule, the number of molecules, conservation law for mass
- 6) Abstraction (how close the mental act is to the subject at hand):**
 - High without the model and pictorial help
 - Thanks to different modalities lower
- 7) Efficiency (speed, accuracy, perceived level of difficulty):**
 - Thanks to different modalities helping to clarify the subject the efficiency is high
 - Without these modalities and clarity, the efficiency is lower or low

The cognitive map describes the nature of the task the child is confronted with. The responses of a child indicate the level of cognitive functions the child can use. The combination of both factors – task and individual – illustrate the reasons for success or failure in solving the task.